

CLAIMS

- 1 1. A water-based, recyclable metalworking fluid comprising:
2 water;
3 a polyalkylene glycol;
4 an alkanolamine;
5 a polyglycol surfactant;
6 a polyol surfactant;
7 a biocide; and
8 a corrosion inhibitor.

- 1 2. The metalworking fluid of claim 1, further including an
2 isoalkyloxy amine oxide.

- 1 3. The metalworking fluid of claim 1, further including a
2 benzotriazole salt.

- 1 4. The metalworking fluid of claim 1, wherein said alkanolamine
2 comprises a mixture of alkanolamines.

- 1 5. The metalworking fluid of claim 1, wherein said alkanolamine
2 is selected from the group consisting of: triethanolamine, diethanolamine,
3 monoisopropanolamine, diisopropanolamine, triisopropanolamine, and
4 combinations thereof.

1 6. The metalworking fluid of claim 1, wherein said biocide
2 comprises a mixture of biocidal materials, said mixture having an antibacterial
3 and an antifungal effect.

1 7. The metalworking fluid of claim 6, wherein said mixture of
2 biocidal materials includes at least one morpholine compound.

1 8. The metalworking fluid of claim 6, wherein said mixture of
2 biocidal materials includes poly(oxy-1,2-ethanediyl(dimethylimino)-1,2-
3 ethanediyl(dimethylimino)-1,2-ethanediyl dichloride).

1 9. The metalworking fluid of claim 1 characterized in that it is free
2 of phenols.

1 10. The metalworking fluid of claim 1 characterized in that it is free
2 of fatty acids.

1 11. The metalworking fluid of claim 1, wherein said polyglycol
2 surfactant comprises a polyoxypropylene-polyoxyethylene block copolymer.

1 12. The metalworking fluid of claim 1 wherein the polyol surfactant
2 comprises poly(oxy-1-2-ethanediyl),alpha-(4nonylphenyl)-omegahydroxy
3 branched.

1 13. A water-based, recyclable metalworking fluid comprising, on a
2 weight basis:

3 12-14% of a polyalkylene glycol;

4 1-15% of an alkanolamine;

5 5-7% of a polyglycol surfactant;

6 .5-1.0% of a polyol surfactant;

7 10-30% of a corrosion inhibitor;

8 .5-1.0% of a biocide; and

9 the remainder, water.

1 14. The metalworking fluid of claim 13, further including, on a
2 weight basis: 10-12% of isoalkyloxy amine oxide.

1 15. The metalworking fluid of claim 13, further including, on a
2 weight basis: 1.5-2% of a benzotriazole salt.

1 16. The metalworking fluid of claim 13, wherein said biocide
2 comprises a mixture of biocidal materials, said mixture having antibacterial and
3 antifungal effects.

1 17. The metalworking fluid of claim 16 wherein said mixture of
2 biocidal materials includes, on a weight basis, .35-.5% of a morpholine
3 compound.

1 18. The metalworking fluid of claim 16, wherein said mixture of
2 biocidal materials includes, on a weight basis, .5-1.0% of poly(oxy-1,2-
3 ethanediyl(dimethylimino)-1,2-ethanediyl(dimethylimino)-1,2-ethanediyl
4 dichloride).

1 19. The metalworking fluid of claim 13, further including a material
2 selected from the group consisting of: surfactants, antifoaming agents,
3 coloring agents, fragrances, viscosity control agents, and combinations thereof.

1 20. The metalworking fluid of claim 13, wherein the alkanolamine
2 component comprises 13-15% of the composition.

1 21. The metalworking fluid of claim 13, wherein the corrosion
2 inhibitor comprises 8-10% of the composition.

1 22. A method for shaping a metal workpiece, said method including
2 the step of:
3 contacting said workpiece with a water-based, recyclable metalworking
4 fluid, while said workpiece is being shaped, said fluid comprising:

5 a polyalkylene glycol;
6 an alkanolamine;
7 a polyglycol surfactant;
8 a polyol surfactant;
9 a biocide; and
10 a corrosion inhibitor.

1 23. The method of claim 22, including the further steps of:
2 collecting spent metalworking fluid; and
3 recycling said spent metalworking fluid.

1 24. The method of claim 22, wherein said workpiece comprises
2 lead brass, and wherein said method of shaping comprises cutting said
3 lead brass workpiece.

1 25. The method of claim 22, wherein said fluid comprises, on a
2 weight basis:
3 12-14% of said polyalkylene glycol;
4 1-15% of said alkanolamine;
5 5-7% of said polyglycol surfactant;
6 .5-1.0% of said polyol surfactant;
7 10-30% of said corrosion inhibitor;
8 .5-1.0 % of said biocide; and

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9 the remainder water.

1 26. The method of claim 25, wherein said metalworking fluid
2 further includes, on a weight basis, 10-12% of isoalkyloxy amine oxide.

1 27. The method of claim 25, wherein said metalworking fluid
2 further includes, on a weight basis, 1.5-2% of a benzotriazole salt.